

Analysis of Parking Optimization on University Campuses: Case Study of the Tulcán Campus at the University of Cauca

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Abstract : The rapid growth of the vehicle fleet worldwide has posed significant challenges in urban areas, such as congestion and a shortage of parking spaces, a situation also observed at the Tulcán campus of the University of Cauca, where the increase in vehicles and motorcycles has exceeded the available parking capacity, causing queues and delays during peak hours. This study aims to optimize parking spaces for vehicles and motorcycles on the campus through a detailed analysis of parking supply and demand, as well as the use of technological tools to improve space management. The growing demand for parking, driven by the expansion of the university community, has led to mobility issues and service inefficiencies, negatively impacting academic and work activities. Through a literature review and data collection via a vehicle counting system on two specific dates, the study found that the campus has 295 motorcycle parking spaces (250 marked) and 192 vehicle spaces, but there is a deficit of 155 spaces, as regulations require 347. Additionally, it was found that the university does not meet the regulatory requirements for parking spaces reserved for individuals with limited mobility, as it should have 7 spaces but currently only has 2. The analysis also revealed that 74% of users are students, and motorcycles are the most commonly used mode of transport, accounting for 70% of users. Peak hours were recorded between 7:00 and 7:15 a.m. and between 8:45 and 9:00 a.m., during which parking occupancy reached 100%, causing congestion and delays. The areas with the highest demand were Zones 5, 1, and 2, primarily due to distance and living costs. As the next steps, two additional processes will be carried out: monitoring vehicle movement via cameras and conducting interviews with members of the university community to better understand their behavior and develop a simulation using the PTV VISSIM software, which will allow the evaluation of optimization alternatives for the available spaces. This study is crucial for improving parking management on campus, optimizing space usage, reducing congestion, and enhancing internal mobility.

Keywords : parking lots, university, simulation, parking management

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